# THE ANTI-BURGLAR ALARM SYSTEM AND ANTI FIRE SECURITY BUILDING

**CONCEIVED AS A CONDITION OF COMPLETING STRATA STUDIES PROGRAM AT THE DEPARTMENT OF ELECTRICAL ENGINEERING, FACULTY OF ENGINEERING**


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# THE ANTI-BURGLAR ALARM SYSTEM AND ANTI FIRE SECURITY BUILDING

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**Abstract**

There are several reasons why this theme is raised: first, the house or building as a place of human activity and other storage of valuables requires a system of protection that is easy to operate and affordable price.The purpose of this study is to make a series of alarm systems that can detect thieves and explain how. After doing the data retrieval test and conducted a brief analysis, the authors can draw the following conclusions: Thermal sensor circuit using phototransistor and temperature. The sensor works by exploiting the moment when the temperature by the movement of the door or window is opened by force by the thief so that the alarm triggers to sound. Series of fire sensors (fire) using LM35 as the sensor. When the LM35 gets a fire around it the alarm will sound with a good response time. As a data processor this input device uses an OR gate, a transistor and a relay to adjust the siren activation and display monitoring. Two-tone sirens are generated by the timer as an astable multivibrator. The overall alarm system works well where the sensors have a fast response time. By looking at the tool testing data for each block of the circuit, the error factor is relatively small.

**Keywords:** anti burglar alarm system, anti fire security building.

**Abstrak**

Ada beberapa alasan mengapa tema ini dinaikkan: pertama, rumah atau bangunan sebagai tempat aktivitas manusia dan penyimpanan barang berharga lainnya memerlukan sistem proteksi yang mudah dioperasikan dan harga terjangkau. Tujuan dari penelitian ini adalah membuat Serangkaian sistem alarm yang bisa mendeteksi pencuri dan menjelaskan caranya. Setelah melakukan tes pengambilan data dan melakukan analisis singkat, penulis dapat menarik kesimpulan sebagai berikut: Sirkuit sensor termal dengan menggunakan fototransistor dan suhu. Sensor bekerja dengan memanfaatkan saat ketika suhu oleh gerakan pintu atau jendela dibuka dengan paksa oleh si pencuri sehingga alarmnya berkeras terdengar. Serangkaian sensor api (api) menggunakan sensor LM35 sebagai. Saat LM35 menyalakan api di sekitarnya, alarm akan berbunyi dengan waktu respons yang baik. Sebagai pengolah data perangkat input ini

menggunakan gerbang OR, sebuah transistor dan relay untuk mengatur pengaktifan sirene dan monitor display. Sirene dua nada dihasilkan oleh timer sebagai multivibrator astabil. Sistem alarm keseluruhan bekerja dengan baik dimana sensor memiliki waktu respon yang cepat. Dengan melihat data pengujian alat untuk setiap blok rangkaian, faktor kesalahannya tergolong kecil.

## 1. Introduction

The development of technology and information is now progressing significantly and very rapidly. Sophisticated technology has been widely found along with the increasingly complex human needs. With some electronic tools and test software, we can construct a simple alarm, but have similar functions to the anti-theft alarms sold on the market. In addition, armed with basic capabilities in electronic systems we have been able to arrange this anti-theft alarm.

The house or building as a place of human activity and other storage of valuables requires a system of protection that is easy to operate and affordable price, the events that often endanger the house and its inhabitants are theft and fire. Theft and fire incidents caused by the weakness of prevention and security systems, especially in urban areas.
. The slow response by the relevant agencies in case of theft or fire. The purpose of this study is to make a series of alarm systems that can detect thieves and explain how.

The process works. Obtain a form of circuit that is able to detect the symptoms of fire and explain how it works. Obtained a clear information on how the input processing model of both sensors and response models is used. Analyze the overall alarm system.

This alarm system is very useful to reduce the occurrence of theft and fire actions that hit the house or building

## 2. Theory

The notion of circuits and digital systems is closely related to the understanding of circuits and systems in the field of electronics. The electronic circuit is defined as the unity of both passive and active electronics components that constitute a signal processing function. In this case the passive component is an electronic component which in its operation does not require a power supply and its nature can not do the strengthening to the current or electric voltage, while the active component is the electronic component which in its operation requires power supply and has the properties can strengthen the signal or electric voltage. Examples of passive components are resistors, capacitors, and inductors, whereas examples of active components are transistors. Types of signal processing include amplification, signal generation (oscillation), and modulation.

Anti-theft alarm circuit is a series that combines several components of electronics ie photodiode, infrared, and IC 7432. As for the indicator used LED and Speaker. Infrared is used as a transmitter while Photodiode is used as a receiver in this case. When there is an object approaching toward the 2 sensors, the speaker will emit a sound and the LED will light up .

## 3. Overview of system flow

As shown in figure (1) the diagram of flowchart start the mission with initialization for the software and the hardware ,after that wll be read the value of sensor LM35_1 ,2,3 and if the value of these sensor bigger than 70 so the Fire1,2,3_state will be ON ,and if the value of these sensor smaller than 70 so the operation will repeat again .
after Fire1,2,3_state is ON so the 7 segment blink buzzer will be on and alarm gnna be triggered and also about PIR sensor if that sensor sense any movement around so that sensor will be on to show that on 7 segment and the alarm also will be on and if its not sense any movement so the operation will repeat again .

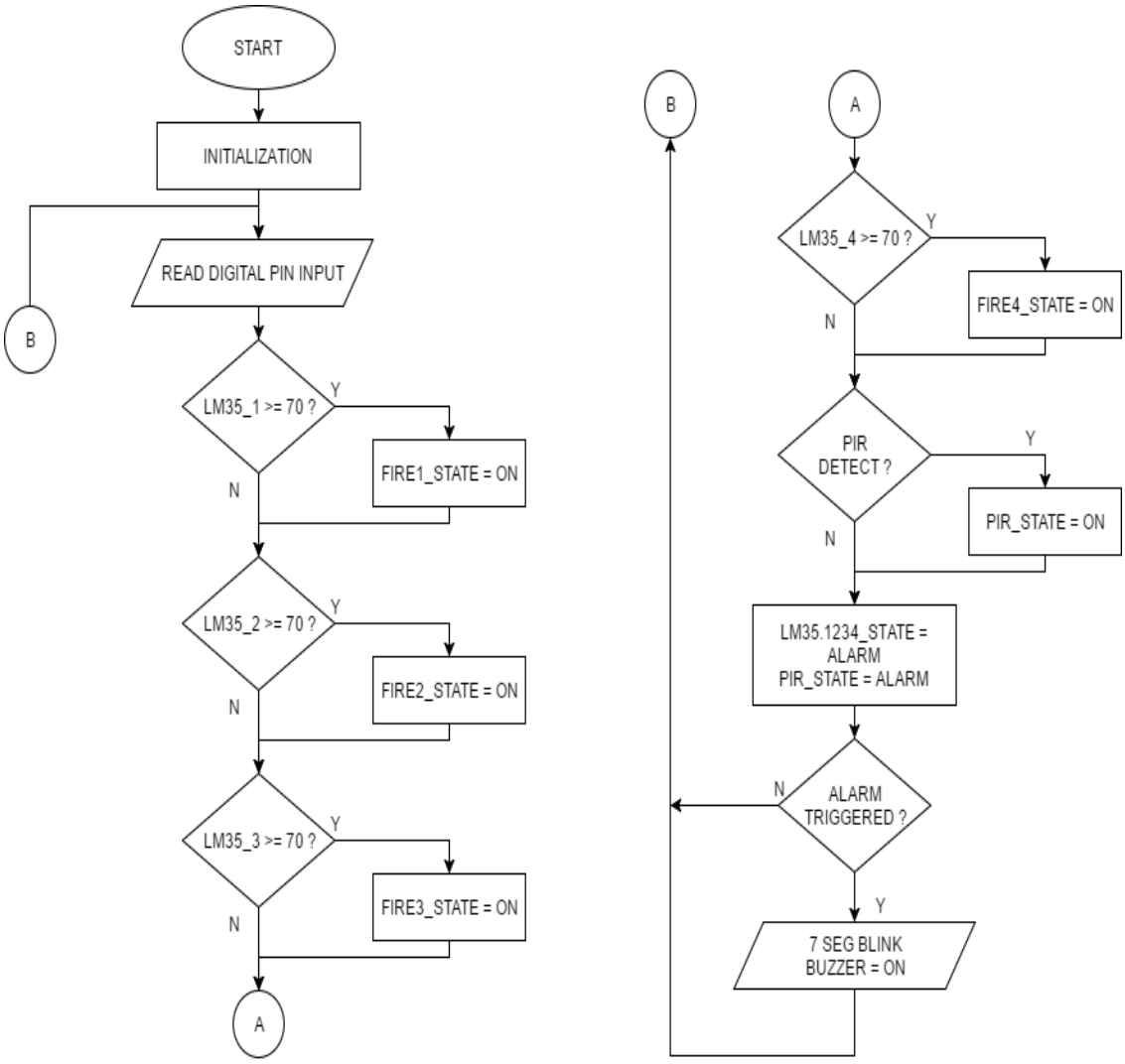


Figure 1. Flowchart Diagram

## 4. Device System

### Microcontroller Arduino Type Nano R3

Arduino Nano is a surface mountboard board that is put on an integrated version with USB. The Arduino Nano is the smallest, complete, and good-sized boardboard. Arduino Nano has everything Duemilanove has with analog input pins and buoy + 5V AREF jumper. Physically, the electrical outlet will be lost. Nano automatically makes sense and switches to higher potential resources, no need for power select jumpers .

Nano's have advantages of breadboard from Boarduino and Mini + USB with smaller footprint, so users have more bread space. It's got pin layouts that work well with Mini or Basic Stamp at one top, power and ground on the other side) . in figure 1 we can see the micro controller nano R3 all .

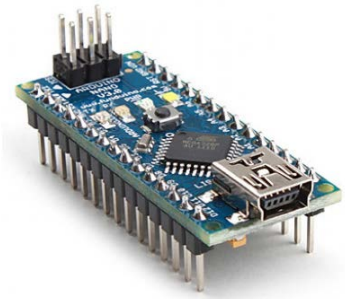

Figure 1. Mikrokontroler Arduino Nano R3

**PIR Sensor**

Sensitive motion segment feel the presence of movement near to a distance of 3 to 7 meters delay time of 5 seconds has been added to him a plastic dome to increase the spread of waves and senses the presence of motion at an angle of 110 degrees,Its a kind of sensor that sense the movement and the light from any object in his area and PIR its a short cut of PASSIVE IFREAD SENSOR ,figure (2) show us the PIR sensor looks from the body .

Figure 2. Module Sensor PIR

Individual PIR sensors can know the changes in the amount of infrared radiation that beats them, which vary in temperature and characteristics. Once the object, like a person, passes in front like a wall, the temperature at the point on the sensor surface will rise from temperature to body temperature, and back again .
The sensor changes the changes that occur to the infrared input into the output voltage changes, and this is a detection error. Objects with the same temperature but have different infrared emission patterns, so release the detector as well.

**LM35 Temperature Sensor**

Temperature sensor is a special tool for the size of hot or cold objects. LM35 is a precision temperature sensor IC with output proportional to temperature (in ° C). With LM35, the temperature can be measured more accurately than the thermistor. Sensor temperature also has

low self-heating and can not rise temperatures above 0.1 ° C in air. Operating temperature range from -55 ° C to 150 ° C. Low output impedance LM35, linear output, and inherent calibration for readability or control are very easy. Temperature sensors have found their applications on power supplies, battery management, equipment, etc..

**Motor DC**

Brushless DC Fan on the shape is a fan like we can see in figure (4) that uses a brushless DC motor, because it consumes less energy than AC motors and is more durable under certain conditions. DC motor is the first type that is used, because it can be propped up from existing current-owned system. The speed of DC motors can be contained in a wide range, using variable supply voltages or by changing the current strength in the field. Small DC motors are used in tools, toys, and equipment. A universal motor that can be used on a direct motor but is a lightweight motor used for portable electrical appliances and equipment. Larger DC motors can be used in propulsion of electric vehicles, lifts and hoists, or on drives for steel rollers. The emergence of existing power electronics motors with AC motors that may exist in many applications .

Figure 4. Brushless Motor DC Fan

**7 Segment**

The seven segment display as we see in figure (5) is a form of electronic display device to be able to display decimal numbers that are an alternative to more complex dot matrix displays. The seven-segment display is used in digital clocks, electronic meters, basic calculators, and other electronic devices that display numerical information.

The seven segments are arranged as rectangles of two vertical segments on each side with one horizontal segment at the top, middle, and bottom. In addition, the seventh segment divides the two rectangles horizontally. The 7-segment display segment is called by the letters A

through G, where at the optional decimal point (the "eighth segment", called DP) is used to display non-integer numbers .

In a simple LED package, usually all the anodes (positive terminal) LED segments are connected and brought to the same pin; These are called "common cathode" or "common anode" devices. Therefore, a 7 segment plus decimal point package will only require nine pins, although commercial products usually contain more pins, and / or whites where pins will go in, to fit the standard IC sockets .

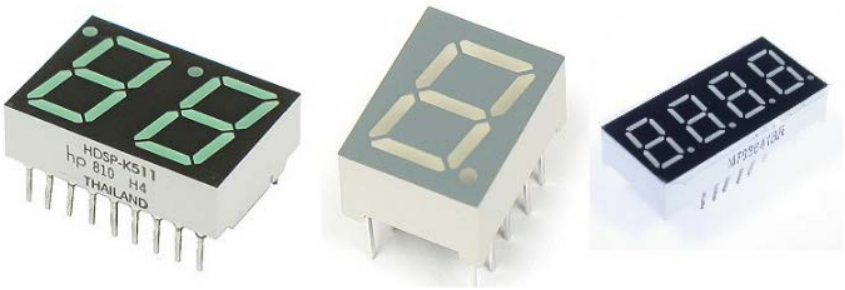


Figure 5. Segments LED

**Buzzer**

The bell is an audio signal device, which is mechanical, electromechanical. Typical usage buzzer and beepers include alarm devices, timers, and user input confirmation such as mouse click or keystroke .

The initial device with an electromechanical system that is identical to the electric bell without a metal gong. Similarly, the relay can interfere with its own driving current, so. Often this unit is anchored to a wall or ceiling to be used as a soundboard. The word "bell" comes from a hoarse voice made by the electromechanical buzz.
in figure 6 we can see the buzzer looks shape .

Figure 6. Buzzer

## 5. Design And Realization Of Tools

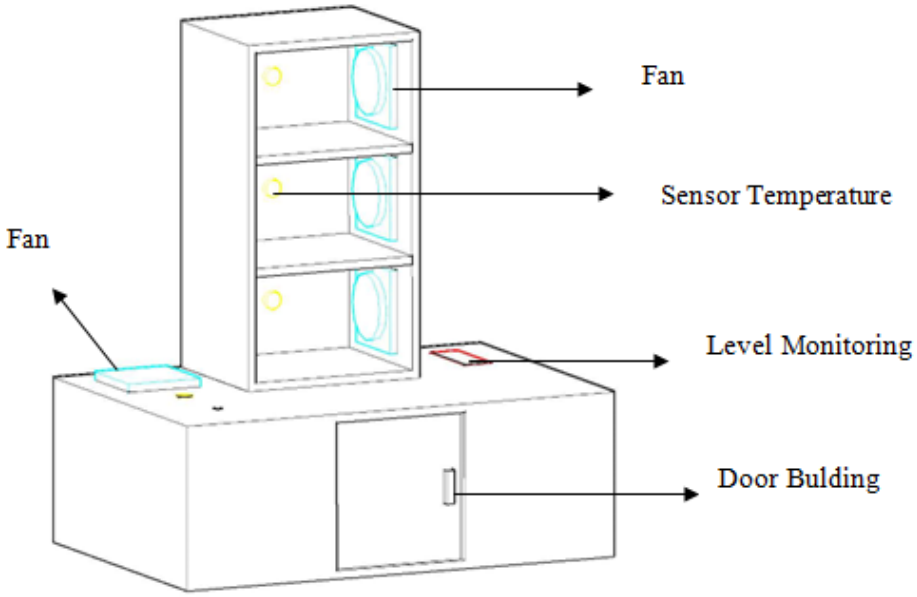


Figure 7. Miniature Design of Anti-theft and Fire Detection

System operational is divided by 3 sections. Input, Process, Output. In Input Section, we have 2 sensor installed, first one is PIR sensor as theft detector and the second is LM35 as fire detection. This system have 4 level in the miniature, in the first level we placed the theft detector in main door and fire detector inside the room. On the level 2 , level 3, and 4, there will be only fire detectors. PIR will detect any heat movement produced by any living body temperature, if something have body temperature as we can call it 'unwanted visitor' entering the PIR sensor detection range, sensor will be triggered and sending logic data to the microcontroller to be processed. Meanwhile the LM35 will monitor the temperature inside the room, if inside the room there is a fire source being lit and reached the limit temperature that we set in the system, the data will be sent from fire detector sensor to microcontroller to be processed .

In the Process Section, microcontroller works as processing unit. It will running a cycle of program that we wrote before and uploaded it into it. Microcontroller will check any input that given to it all the time. After collecting data from input, microcontroller will determine if one of the sensor are triggered. It will execute a certain program to react on the sensor detection and send the data as and output to output section .

In the Output Section, we have 4-digit 7 segment as indicator, a buzzer as alarm sound, and 4 DC fan one each level to simulate a fire extinguisher system. The 4-digit 7segment will indicate 4 level condition of fire

detection. If one or more level have fire detection triggered, the 7segment will blink continously according to the level. The buzzer will play emergency sound as it beeps continously if theft detection or fire detection is triggered. Then for the DC Fan it will turned on as it simulate fire extiguishing system on which level has been detected fire . why i choose the shape like i show in figure (7) ,because the normally real building and structure arond it almost looks like this shape and i choose to put PIR sensor becaus if burglar will not reach any level of building if the not enter from the base .

**Here we can see every single curcuit from the component that i was used in this project like :-**

**Theft Sensor Circuit :- PIR circuit sensor shown in figure 10**

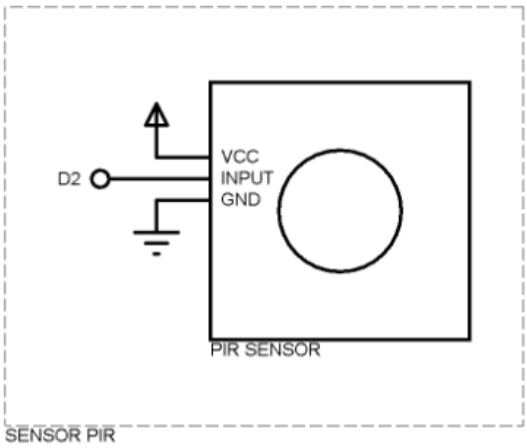


Figure 10. Module Sensor PIR

**Fire Detection Circuit & Emergency Button Circuit**

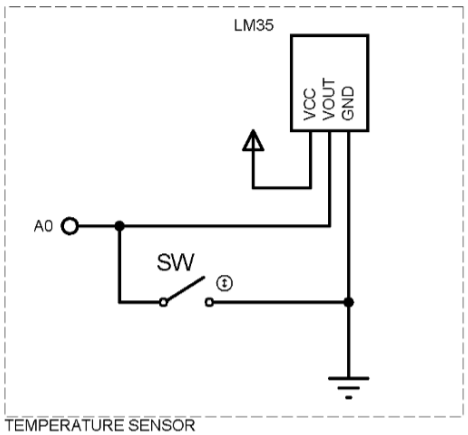


Figure 11. Fire Detection & Emergency Button Circuit

**DC Fan Circuit :-** as we see in figure 12 its contain a fan with 2 resistor every single resistor = 1 k ohm,with a source of dc , with 5 volt voltage used in .

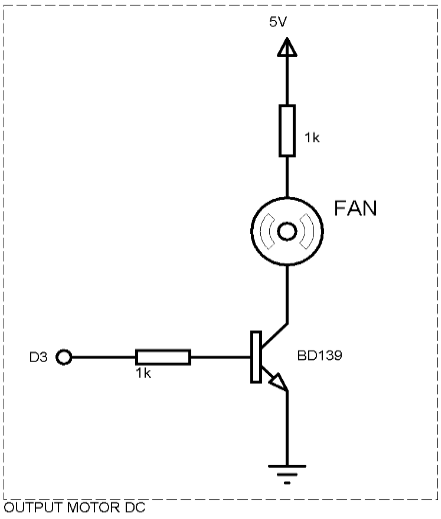


Figure 12. DC Fan Circuit

**Segment Display Monitoring Circuit**

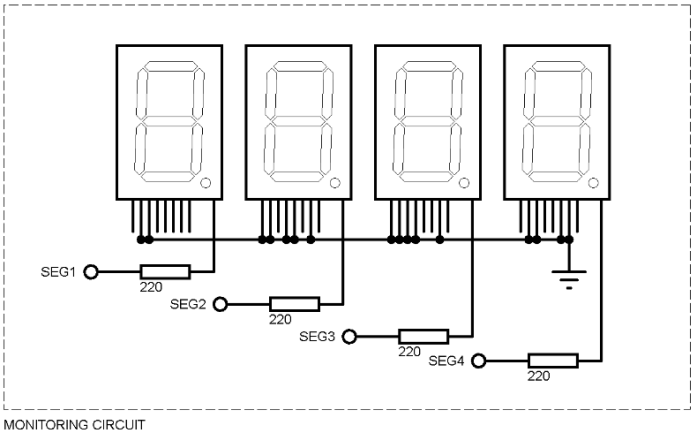


Figure 13. 7 Segment Display Monitoring Circuit (Common Anode)

**Alarm Buzzer Circuit**

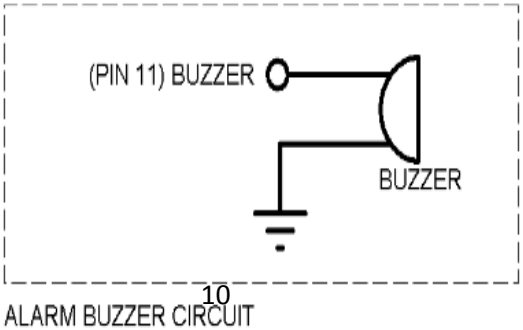

Figure 14. Alarm Buzzer Circuit

## 6. THE RESULT AND ANALYSIS

### 6.1. Test Objectives

To find out if the tool works properly and correctly, does each component work according to characteristics it has or not. By looking at the test results we will be able to analyze and make conclusions.

### 6.2.2 Testing Results

### 6.2.1. Test Circuit And Response Time Of Fire Sensor

Table 1. LM35 Test Condition when heated with fire

| Sensor | Above 70 ℃ | Below 70 ℃ | Condition |
|---|---|---|---|
| LM35_1 | Active | Not Active | Sensor is heated with fire source in two condition, until it reached temperature limit and below temperature limit |
| LM35_2 | Active | Not Active | |
| LM35_3 | Active | Not Active | |
| LM35_4 | Active | Not Active | |

### 6.2.2. Testing PIR sensor voltage when the sensor is detected/not detected

Table 2. PIR sensor voltage when the sensor is detected/not detected

| Sensor | V (Volt) | A (mA) | Condition |
|---|---|---|---|
| Active | 5 | 2.1 | PIR is detecting body temperature movement |
| Not Active | 0 | 0 | PIR is not detecting anything |

### 6.2.3. Tests display monitoring circuit

Table 3. Logic Table of The System, Sensor Activated Is Represented With Logic 1 And Not Activated With Logic 0

| No | PIR | LM35_1 | LM35_2 | LM35_3 | LM35_4 | ALARM |
|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 1 | 0 | 0 | 0 | 0 | 1 |
| 3 | 0 | 1 | 0 | 0 | 0 | 1 |
| 4 | 1 | 1 | 0 | 0 | 0 | 1 |
| 5 | 0 | 0 | 1 | 0 | 0 | 1 |
| 6 | 1 | 0 | 1 | 0 | 0 | 1 |
| 7 | 0 | 1 | 1 | 0 | 0 | 1 |
| 8 | 1 | 1 | 1 | 0 | 0 | 1 |
| 9 | 0 | 0 | 0 | 1 | 0 | 1 |
| 10 | 1 | 0 | 0 | 1 | 0 | 1 |
| 11 | 0 | 1 | 0 | 1 | 0 | 1 |
| 12 | 1 | 1 | 0 | 1 | 0 | 1 |
| 13 | 0 | 0 | 1 | 1 | 0 | 1 |
| 14 | 1 | 0 | 1 | 1 | 0 | 1 |
| 15 | 0 | 1 | 1 | 1 | 0 | 1 |
| 16 | 1 | 1 | 1 | 1 | 0 | 1 |
| 17 | 0 | 0 | 0 | 0 | 1 | 1 |
| 18 | 1 | 0 | 0 | 0 | 1 | 1 |
| 19 | 0 | 1 | 0 | 0 | 1 | 1 |
| 20 | 1 | 1 | 0 | 0 | 1 | 1 |
| 21 | 0 | 0 | 1 | 0 | 1 | 1 |
| 22 | 1 | 0 | 1 | 0 | 1 | 1 |
| 23 | 0 | 1 | 1 | 0 | 1 | 1 |
| 24 | 1 | 1 | 1 | 0 | 1 | 1 |
| 25 | 0 | 0 | 0 | 1 | 1 | 1 |
| 26 | 1 | 0 | 0 | 1 | 1 | 1 |
| 27 | 0 | 1 | 0 | 1 | 1 | 1 |
| 28 | 1 | 1 | 0 | 1 | 1 | 1 |
| 29 | 0 | 0 | 1 | 1 | 1 | 1 |
| 30 | 1 | 0 | 1 | 1 | 1 | 1 |
| 31 | 0 | 1 | 1 | 1 | 1 | 1 |
| 32 | 1 | 1 | 1 | 1 | 1 | 1 |

Logic 1 = Active , Logic 0 = Not Active

Where as:

PIR= Sensor PIR

ALARM= Buzzer

LM35_1= Sensor Temperature 1

LM35_2= Sensor Temperature 2
LM35_3= Sensor Temperature 3
LM35_4= Sensor Temperature 4

## 7. CONCLUSIONS AND SUGGESTIONS

### 7.1. Conclusion

After doing the data retrieval test and conducted a brief analysis, the authors can draw the following conclusions:

1. Thermal sensor circuit using phototransistor and temperature. The sensor works by exploiting the moment when the temperature by the movement of the door or window is opened by force by the thief so that the alarm triggers to LM35 sound. Series of fire sensors (fire) using LM35 as the sensor. When the gets a fire around it the alarm will sound with a good response time.
2. As a data processor this input device uses an OR gate, a transistor and a relay to adjust the siren activation and display monitoring. Two-tone sirens are generated by the timer as an astable multivibrator. The overall alarm system works well where the sensors have a fast response time. By looking at the tool testing data for each block of the circuit, the error factor is relatively small.

### 7.2. Recommendation

Based on the result, so the recommendation in this research as follows :

1. To obtain a sensor device that has a very small response time selectively select the sensor component, buy a quality although somewhat more expensive than generally because this is where the heart of this circuit.
2. Test the components and the circuit above the protoboard before the assembly is done to avoid errors and component damage when assembled.
3. Make the PCB design as simple as possible so that it is easy to do damage allocation if it happens.

## 8.Acknowledgments

This proposal was supported by the startup package of journal and the internet research. I thanks my supervisor. As well all the lecturers of the (UMS) for his contributions to implementation of the algorithm in my proposal. I would also like to thank my Friend for helping and supporting me for making my project

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